CLAIMS

1. A transgenic mouse which has integrated a reporter gene in the locus of the Cx40 gene, wherein said reporter gene is expressed in the different components of the cardiac conduction system (CCS) including the atrio-ventricular node (AVN), His bundle, bundle branches and Purkinje fibers.

2. A transgenic mouse according to claim 1, which is capable of transmitting the knocked-in reporter gene to their offsprings.

3. A transgenic mouse according to claim 1, referred as $Cx40^{KIGFP/+}$, wherein said reporter gene is eGFP.

4. A $Cx40^{KIGFP/+}$ mouse according to claim 3, wherein the Cx40 gene is active and wherein the Cx40 protein is expressed and co-localized with the eGFP transgene.

5. A mouse offspring resulting from the crossing of a mouse according to claim 1 or 4 with a mouse of the same or different genetic background, wherein said mouse offspring is a double eGFP+ allele.

6. A $Cx40^{KIGFP/+}$ mouse according to claim *5,* wherein it further comprises at least one allele which is inactivated.

7. A $Cx40^{KIGFP/+}$ mouse according to claim 1 or 4 useful as cardiac conduction system model.

8. A $Cx40^{KIGFP/+}$ mouse according to claim 1 or 6, wherein the eGFP+ cells present electrical features of conductive cardiomyocytes and wherein the anatomical description of the left and right bundle branches are correlated with their respective electrical activity maps recorded, providing an accurate image of the entire mouse ventricular conduction system.

9. A $Cx40^{KIGFP/+}$ mouse according to claim 8, wherein the GFP images obtained after applying action potentials stimuli correspond to the electrical activation maps.

10. A method for performing electrophysiological studies of the mouse CCS comprising applying an action potential stimuli to a mouse according to claim I or 8 and taking images of fluorescent tissues with a digital camera.

11. A method for testing whether or not a compound is inducing cardiac arrhythmias comprising administering said compound to a mouse according to claim 1 or 8 and taking images of fluorescent tissues with a digital camera.

12. A method for screening compounds capable of preventing or treating cardiac arrest comprising administering candidate compounds and inducing ventricular fibrillation to a mouse according to claim 1 or 8, taking images of fluorescent tissues with a digital camera and selecting a subset of compounds for which cardiac protection is observed in said fluorescent images.

13. A method for screening compounds capable of preventing or treating a cardiovascular disease comprising administering candidate compounds and inducing the onset of said cardiovascular disease to a mouse according to claim 1 or 8, taking images of fluorescent tissues with a digital camera and selecting a subset of compounds for which cardiovascular disease protection or cure is observed in said fluorescent images.

14. A method according to one of claims 10 to 13 further comprising an action potential recordings.

15. A method according to one of claims 10 to 13 further comprising an ECG recording and a septal mapping.